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EXAMINER	
WEATHERBY, ELLSWORTH	

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3768	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/550,118	Applicant(s) AKIYAMA ET AL.	
	Examiner ELLSWORTH WEATHERBY	Art Unit 3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/02/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 3 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 3, "a motor controlling element" is set forth in two separate instances. Therefore, it is impossible to determine whether or not the claim is referring to an additional motor controlling element or a further limitation of the single motor controlling element.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Utenick (USPN 4,429,262) in view of Amrhein (USPN 5,274,313).

5. Utenick teaches a rotary controlled ultrasonic probe where the digital position count from a counter is coupled to a memory, which maintains, in storage, representations of position, and torque characteristics of the motor where based on the

stored and determined positions the memory issues controls signals for correction purposes (Abstract; col. 1, ll. 29-56 Figs. 1-3). Utenick goes on, teaching a diagnostic ultrasonic transducer that scans an ultrasonic beam (col. 1, ll. 6-40; col. 2, ll. 29-33); a transducer-swinging motor that allows the ultrasonic transducer to perform swing scanning in a direction crossing a scanning direction of the ultrasonic beam (col. 2, ll. 29-57); a rotary encoder that generates a pulse according to a rotation position of the transducer swinging motor (col. 3, ll. 23-44; col. 7, ll. 21-67); and an encoder correction ROM (114) that stores scanning angles with respect to each count value obtained by counting pulses from the encoder, and outputs the measured and stored scanning angle of the ultrasonic transducer (abstract; col. 2, ll. 15-57; col. 3, l. 23- col. 4, l. 24; col. 6, ll. 22-44). Utenick also teaches that the encoder correction ROM stores swing directional angles that are different between a forward path of swing scanning and a return path of the swing scanning (col. 4, ll. 15-24 & 60-66; col. 5, l. 33-col. 6, l. 55). Utenick teaches that the rotary encoder correction memory capable to store a previously measured swing scanning angle characteristics of the ultrasonic transducer with respect to each of a plurality of values obtained from the rotary encoder (col. 3, ll. 45-65; col. 4, ll. 49-59; col. 6, ll. 22-67), and capable to outputs previously measured and stored swing scanning angle of the ultrasonic transducer for use in correction (col. 3, ll. 45-65; col. 4, ll. 40-59; col. 5, ll.).

6. Utenick teaches all the limitations of the claimed invention except for expressly teaching that the count values are obtained by counting pulses from the rotary encoder

over an entire swing range of the ultrasonic transducer, and configured to output the previously measured and stored swing scanning angle of the ultrasonic transducer.

7. In a related field of endeavor, Amrhein addresses a method for actuating motors having an optimum function which is previously determined and stored in a function memory to achieve a prescribed power or torque characteristic without fluctuation (Abstract; col. 1, ll. 5-25; Figs. 1-10). Here, a memory (30) stores the curve (34, 32) with respect to a signal determined from the angle encoder (2) (col. 3, ll. 35-50; col. 4, ll. 38-52; col. 12, ll. 8-27). The purpose of the system is address and correct the various influences that would cause fluctuations in the uniformity of operation (col. 3, l. 61- col. 4, l. 2; col. 5, ll. 60-65). Therefore, the correction ROM is configured to store previously measured angles with respect to each count value.

8. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the rotary ultrasonic probe of Utenick in view of the correction means of Amrhein. The motivation to modify Utenick in view of Amrhein would have been to utilize any known means for correction of error thereby reducing distortion, as is well known in the art.

9. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Utenick (USPN 4,429,262) in view of Amrhein (USPN 5,274,313) and Pini (USPN 5,159,931).

10. Utenick teaches a rotary controlled ultrasonic probe where the digital position count from a counter is coupled to a memory, which maintains in storage

representations of position, and torque characteristics of the motor where based on the stored and determined positions the memory issues controls signals for correction purposes (Abstract; col. 1, ll. 29-56 Figs. 1-3). Utenick goes on, teaching a diagnostic ultrasonic transducer that scans an ultrasonic beam (col. 1, ll. 6-40; col. 2, ll. 29-33); a transducer-swinging motor that allows the ultrasonic transducer to perform swing scanning in a direction crossing a scanning direction of the ultrasonic beam (col. 2, ll. 29-57; col. 8, ll. 22-25); a rotary encoder that generates a pulse according to a rotation position of the transducer swinging motor (col. 3, ll. 23-44; col. 7, ll. 21-67); and an encoder correction ROM (114) capable to store scanning angles with respect to each count value obtained by counting pulses from the encoder, and capable to outputs the measured and stored scanning angle of the ultrasonic transducer (abstract; col. 2, ll. 15-57; col. 3, l. 23- col. 4, l. 24; col. 6, ll. 22-44). Utenick also teaches that the encoder correction ROM stores swing directional angles that are different between a forward path of swing scanning and a return path of the swing scanning (col. 4, ll. 15-24 & 60-66; col. 5, l. 33-col. 6, l. 55). Utenick further teaches storing a previously measured swing scanning angle characteristic of the ultrasonic transducer motor with respect to each of a plurality of values obtained from the rotary encoder (col. 3, ll. 45-65; col. 6, ll. 22-67), and outputs previously measured and stored swing scanning angle of the ultrasonic transducer for use in correction (col. 3, ll. 45-65; col. 4, ll. 40-59). Utenick also teaches an encoder counter (ref. 142).

11. Utenick teaches all the limitations of the claimed invention except for expressly teaching that the count values are obtained by counting pulses from the rotary encoder

over an entire swing range of the ultrasonic transducer, and configured to output the previously measured and stored swing scanning angle of the ultrasonic transducer. Utenick also does not expressly teach a transmitting/receiving element. Utenick also does not expressly teach a 3D image processing element.

12. In a related field of endeavor, Amrhein addresses a method for actuating motors having an optimum function which is previously determined and stored in a function memory to achieve a prescribed power or torque characteristic without fluctuation (Abstract; col. 1, ll. 5-25; Figs. 1-10). Here, a memory (30) stores the curve (34, 32) with respect to a signal determined from angle encoder (2) (col. 3, ll. 35-50; col. 4, ll. 38-52; col. 12, ll. 8-27). The purpose of the system is to address and correct the various influences that would cause fluctuations in the uniformity of operation (col. 3, l. 61- col. 4, l. 2; col. 5, ll. 60-65). Here, a motor controlling element is configured to read out the previously determined correction curve and perform driving control on the motor according to the count value from the encoder counter (col. 11, ll. 2-45; col. 11, l. 55-col. 12, l. 28).

13. Amrhein does not expressly teach a transmitting/receiving means. Amrhein also does not expressly teach a 3D image processing element.

14. In the same field of endeavor, Pini '931 (hereinafter) Pini teaches a counter that controls a counter for sector scanning and a counter for rotation control which are combined for controlling the stepper motor driver (col. 8, ll. 40-58). Pini also teaches a transmitting/receiving means that excites the vibrators of the ultrasonic transducer (col. 9, ll. 12-17). Pini also teaches a three dimensional image processing means that

produces a three-dimensional image for display (abstract; col. 8, ll. 33-39; col. 13, ll. 33-36; claim 1).

15. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the rotary ultrasonic probe having position encoding and correcting means of Utenick in view of the improved correction means of Amrhein and the 3D rotary ultrasound of Pini with the correction means of Amrhein. The motivation to modify Utenick in view of Amrhein and Pini would have been to utilize any known means for correction of error thereby reducing distortion in a 3D image, as is well known in the art.

Response to Arguments

16. Applicant's arguments, filed 7/22/2009, with respect to the rejection(s) of claim(s) 1-6 under Hourouchi have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Utenick and Amrhein (USPN 5,274,313) and Pini (USPN 5,159,931). Specifically, the combination of Utenick in view of Amrhein and Pini anticipates or makes obvious the claimed invention where an encoder correction circuit pre-stores rotational characteristics of a motor for use in correcting measured rotational characteristics.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Examiner stands that the following references may be applicable as prior art. However, the purpose of the following references is to clarify the extent to which combinations of the presently claimed limitations exist in the prior art and are set forth for the purposes of clarifying the obviousness of combining each of the claimed limitations in view of known prior art.

18. **Ando et al. (USPN 4,391,282):**

19. Ando teaches an ultrasonic probe (Abstract; Figs. 1-16B), comprising: an ultrasonic transducer configured to scan an ultrasonic beam (col. 5, ll. 60-67; ref. 35); a swinging motor configured to allow the ultrasonic transducer to perform swing scanning in a direction crossing a scanning direction of the ultrasonic beam (col. 6, ll. 1-17; ref. 65); a rotary encoder configured to generate a pulse according to a rotational position of the transducer-swinging motor (col. 6, ll. 39-54); and an encoder correction circuit and ROM configured to store previously measured angles (col. 7, ll. 1-22; col. 7, l. 65- col. 8, l. 52; col. 9, ll. 3-55; col. 10, ll. 17-67).

20. Ando does not expressly teaching that the swinging motor is a transducer swinging motor. Ando also does not expressly teach storing a previously measured swing scanning angle of the ultrasonic transducer with respect to each of a plurality of counting values, wherein the count values are obtained by counting pulses from the rotary encoder over an entire swing range of the ultrasonic transducer, and configured

to output the previously measured and stored swing scanning angle of the ultrasonic transducer.

21. **Webb et al. (USPN 5,699,806):**

22. Webb et al. (hereinafter Webb) teaches an ultrasound system with non-uniform rotation corrector (Abstract; Figs. 1-10). Here, Webb teaches an IVUS probe including a transducer (24) and a shaft (25) for rotating the transducer as an alternative to a reflector (col. 4, ll. 28-44; col. 12, ll. 3-32). A controller controls the transmission and determines the angular spacing between transmissions and uses compensates the spacing if difference exists between the intended angular separation and transmitted pattern (col. 4, ll. 53-67). Webb provides a plurality of equivalent means for correcting the variations between the intended spacing and the transmitted spacing (col. 5, ll. 28-49; col. 6, ll. 52-67; col. 7, l. 59-col. 8, l. 4).

23. **Murty (USPN 4,544,868), Tajima et al. (USPN 5,023,924)**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELLSWORTH WEATHERBY whose telephone number is (571) 272-2248. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/EW/

/Long V Le/
Supervisory Patent Examiner, Art Unit 3768